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PREPARED FOR: U.S. Army Medical Research and Materiel Command  
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| <b>a. REPORT</b><br>U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>b. ABSTRACT</b><br>U | <b>c. THIS PAGE</b><br>U       |                                             |                                                                 | <b>19b. TELEPHONE NUMBER (include area code)</b>  |

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## INTRODUCTION

Current military operations are pushing the Army Reserve Component (ARC) to streamline and optimize its individual medical and dental readiness posture. We proposed development and testing of a web-based package of personal empowering tools enriched with educational modules and practical information, along with a cadre of health coaches to motivate and educate the ARC soldier with the goal of enhancing readiness. The ARC urgently has needed an effective, affordable way to identify the dental and medical issues which impact the operational readiness of its units. With measurable outcomes in education, knowledge, and compliance with regulatory readiness requirements, we sought to demonstrate improved dental education and oral health habits that affect ARC soldiers. We also sought to better characterize the relationship between oral health status and other lifestyle behavior issues that can negatively impact cardiovascular (CV) health. This type of initiative has not been previously tested.

## BODY

During 2009, the web-based tool was successfully created and achieved functionality IAW Statement of Work (SOW D2). From Jan to Jun 2010, the Army Reserve Component Personal Empowerment Program (ARCPEP) enrolled 265 soldiers from the Pennsylvania National Guard for participation. Written informed consent was obtained in every instance. A web-based tool entitled the personal empowerment program (PEP) was implemented from Jun 2010 to Mar 2011. The PEP consisted of a participant and coach platform with on-line survey assessments of health behaviors and knowledge of healthy living. In addition, teaching modules that were personalized based on individual survey responses were sent via email to participants. Bidirectional communication between participant and coach were successfully implemented and verified by documentation and audit trail (SOW B2) pre and post intervention. Website activity was modest and included 8,685 total page views for the intervention group.

**Demographical Information.** The PA National Guard soldiers were predominantly white men with an average age of  $35 \pm 9.1$  years. There were 27 women (10%). Racial distribution included 247 Caucasian, 7 African-American, 5 Latino, 2 Asian, and 4 undeclared. Of 265 soldiers, ten per cent were officers, with 90% NCOs and enlisted soldiers. Officers were at least graduates of a bachelors program and virtually all NCOs and enlisted soldiers were high school graduates. There were too few women, too few non-Caucasians, and too few officers to allow for meaningful comparisons between these groups and their counterparts.

**Service-Related Information.** Half of the soldiers had deployed once, but half had deployed more than once, most of these 2 or 3 times. Soldiers with one deployment numbered 144, two deployments 90, three deployments 26 and four deployments 4. Nearly all deployments were to Iraq. There were two deployments to Pennsylvania, one deployment to New Jersey, one deployment to Kosovo, and one to Kuwait.

### Using Two Sample T-Tests:

Soldiers with multiple deployments were somewhat older (37.3 vs 33.1 yrs,  $p < 0.001$ ); and were less likely to be depressed (13 vs 27,  $p = 0.006$ ). Health Surveys revealed that soldiers with multiple deployments experienced less stress (PSS 20.6 vs 23.6,  $p = 0.003$ ); had better sleep

quality (PSQI 6.7 vs 7.9,  $p = 0.02$ ); shorter sleep latency (22.1 vs 30.0 min,  $p = 0.03$ ); and had fewer nights with bad dreams (0.54 vs 0.79,  $p = 0.04$ ).

Using Pearson Correlation:

Comparisons between soldiers who deployed once and those with more than one deployment revealed that increasing number of deployments correlated mildly with increasing age ( $r=0.2730$ ) and mildly with increasing BMI ( $r=0.1031$ ). Contrary to expectations, increasing number of deployments correlated positively with mood ( $r=0.1028$ ), and negatively with perceived stress ( $r=-0.1346$ ) and negatively with self-reported sleep quality ( $r=-0.1223$ ). There were no correlations between number of deployments and living location (rural vs urban), level of education, habits of dental self care, dietary habits, or daytime symptoms of sleepiness and fatigue.

**Dental/Oral Health Information.** Soldiers need significant improvement in their dental self-care habits, including brushing, flossing, using mouthwash, chewing xylitol gum and visits for teeth cleaning. Scores on the Dental Knowledge Test reflected knowledge deficits in oral health habits with the mean score at 66%.

**Medical Information.** The participants self-reported medical issues that reflect CV risks including high cholesterol 16% and hypertension 11%. Overweight and obesity by BMI were alarmingly high. Only 17% of soldiers were normal weight, 48% were overweight, and 35% were obese. The potential future complications of this phenomenon are enormous.

**Health Survey Results.** These results revealed a number of important findings. In response to a single screening question for depression 53 (20%) indicated depression. This finding was substantiated with corroborating questions such as frequency of early awakenings which occurred at least 2 times per week in 55% of soldiers. Perceived stress levels were high with 50% of soldiers scoring at least mildly elevated stress levels and 15% scoring moderate to severe stress levels. Twenty six per cent of soldiers reported having difficulty dealing effectively with stress. Other health survey instruments revealed a major problem with sleep habits. There was high likelihood of sleep apnea in 40% of soldiers and poor sleep quality in 69%. Soldiers are having trouble getting to sleep, staying asleep, awakening early, having bad dreams, and suffer daytime consequences of insufficient sleep in the form of daytime sleepiness and fatigue.

**Health Behaviors.** Health behavior information showed that most soldiers get their blood pressure checked but too few have cholesterol and glucose checks according to recommended frequency. Very few can actually recall their actual measurements which reduces the degree of personal empowerment to take corrective actions when appropriate. Smoking is common among these soldiers (41%). This is alarming as smoking is a risk equivalent of diabetes for CV disease and oral health disease. Other health behaviors need improvement including dental self-care, exercise frequency, and healthful eating.

**Health Knowledge.** Few soldiers know their BP, cholesterol, or fasting glucose numbers. A minority (22%) of soldiers know about the Vaccine Health Network and re-immunization rates were high (50%) by soldier self-report.

**Data analysis** comparing soldiers according to certain categories revealed interesting findings:

1. Depressed soldiers were deployed less, scored worse on knowledge tests, and suffered from a number of sleep difficulties including too little sleep time, difficulty falling and staying asleep, greater daytime sleepiness and fatigue and greater use of sleep aids.
2. Officers were older, better educated and deployed more frequently. Officers slept more, smoked less and were more likely to eat healthfully. Officers reported less perceived stress, had better sleep quality and experienced less fatigue.
3. Compared to soldiers with single deployments, soldiers with multiple deployments were older, less likely to be depressed, had lower perceived stress levels, had better sleep quality and fewer bad dreams.
4. Soldiers screening positive for sleep apnea were far less healthy. These soldiers were older, fatter, and more likely to have high cholesterol and hypertension. These soldiers brushed their teeth less, smoked more, exercised less, and slept less. They also had higher perceived stress levels, poorer sleep quality, numerous other sleep issues, as well as daytime sleepiness and fatigue.
5. Overweight soldiers were much more likely to have high cholesterol and sleep apnea.
6. Soldiers scoring higher on the dental knowledge assessment test had higher education, better mood, higher overall scores on knowledge tests and followed healthier diets.

### **Intervention Outcomes.**

The ARCPEP experience demonstrated that Guardsmen were disinclined to go online to check email or seek health information and resources. This is in agreement with recently published reports<sup>1,2</sup> and reflects the experience of telemedicine efforts in the DOD. According to COL Ron Poropatich, Deputy Director for the Telemedicine and Advanced Technology Research Center, “Many younger soldiers have moved beyond e-mail as their primary mode of communication. If you e-mail a young soldier, their inbox is usually full.” COL Poropatich goes on to quote young soldiers when they say, “Look, just text me, I don’t do e-mail.”

However, in ARCPEP there was a very positive response to telephonic contact from health coaches who were able to provide information and resource contacts and to gain the cooperation of the soldiers to obtain their personal information and answers to survey questionnaires. The coaches were successful in utilizing the ARCPEP technology tool for emailing, documentation, auto-populating demographics, sending recommendations, deployment of e-education, survey scoring and storage, and interfacing with e-Immune. The ARCPEP technology tool was properly linked with Military One-Source. Furthermore the tool effectively provided a health snapshot, linking survey responses to the soldier’s personal ARCPEP page. Soldiers frequently stated that they appreciated the personal outreach and that they felt cared for by the health coaches. A major success of the health coach platform was the identification of depressed soldiers and the provision of accessible resources to these vulnerable soldiers. In fact, if a soldier responded

affirmatively to the single question screening for depression, it signaled a high likelihood of clustering of other maladaptive health behaviors with profound long-term health consequences.

The PA National Guard soldiers are spread out. Finding a virtual mode of “seeing” and helping soldiers is of critical importance. The ARCPEP experience suggests that the ARCPEP approach via the health coach platform is the right one.

A major point to stress is that ARCPEP provided an assessment mechanism that was successful and non-threatening. Soldiers could be evaluated for important dental issues, medical issues and behavioral choices in a non-stigmatizing atmosphere that encouraged honest responses. Soldiers with depression, high stress levels, and other emotional problems were identified and could thereby be contacted to provide support. Current screening techniques may be inadequate for the identification of depression and other stress-related conditions for which our survey data revealed much evidence.

ARCPEP revealed significant oral health issues. The data identified numerous opportunities for improvement both in oral health maintenance and preventive behaviors as well as in dental health knowledge. Both the intervention cohort (n = 110) and the control cohort (n = 155) were tested for dental health knowledge at the start of the protocol before an intervention. The intervention included making available such resources as links to education materials for dental health and other credible health information resources. The intervention group received telephone calls from the health coaches with structured questions and answers designed to encourage use of the ARCPEP website and adoption of healthy behaviors to correct deficiencies identified in the intake questionnaires. For intervention group participants who were not accessible by phone, emails were utilized by health coaches to maintain contact. **The ARCPEP intervention group demonstrated improvement in their dental health knowledge (70% to 77%, p = 0.06) compared to the control group (71% to 75%, p = 0.23) indicating a significant difference in acquisition of information as it relates to dental self-care knowledge.** (SOW C1) There was no impact of the personal empowerment program on dental readiness by DENCLASS (SOW D2). This was in large part because the dental readiness of the ARC had improved dramatically from 2008 to the implementation date of the protocol (2010) such that there was little room for improvement. Furthermore, the planned redeployment to Kuwait of the soldiers of the Pennsylvania ARNG diminished enthusiasm for participation in the ARCPEP.

Medical problems with recently recognized importance, such as sleep apnea and disturbed sleep were identified and are baseline information to stimulate interventional follow on research. The astonishing prevalence of overweight and obesity was determined and provides important information for strategy development to address this epidemic problem.

An abstract of the central findings of the protocol was presented in poster format by the Principal Investigator at the Armed Forces Public Health Conference (18 to 25 March 2011) in Hampton Roads, Virginia. A manuscript has been written and submitted to *Military Medicine* describing the readiness findings particularly dental readiness, effects of multiple deployments, and the impact of depression and other maladaptive health behaviors. This manuscript is under review. Other publications are planned and include abstracts and manuscripts that address: 1. Overall

prevalence of health risks in the PA Army National Guard, 2. Utility of the non-stigmatizing approach to identify depression, 3. Prevalence and associated co-morbidities of stress in an Army National Guard population, and 4. Prevalence and co-morbidities of sleep issues in the Army National Guard.

## KEY RESEARCH ACCOMPLISHMENTS

- The ARCPEP web-based tools including participant, coach and administrative platforms were successfully designed, created, and achieved functionality.
- The ARCPEP web-based health coach platform was particularly successful in the assessment, identification and documentation of dental habits and health behaviors
- The ARCPEP tool with health coaching can educate/motivate soldiers regarding dental care based on a dental knowledge tests but did not appreciably improve DENCLASS.
- The ARCPEP integrative approach to assessment may help to identify health issues for earlier intervention. This has the potential for long-term health cost savings and requires further investigation.

## REPORTABLE OUTCOMES

Dela Cruz G, Vernalis M, Kashani M, Bishop A, Russo J, Eliasson A. Health indicators in the Army reserve component affect military readiness. Armed Forces Public Health Conference Mar 2011; Hampton Roads VA, poster presentation

Eliasson AH, Kashani M, Dela Cruz G, Vernalis M. Readiness and associated health behaviors and symptoms in Army National Guard soldiers. Mil Med 2011 submitted for publication

## CONCLUSIONS

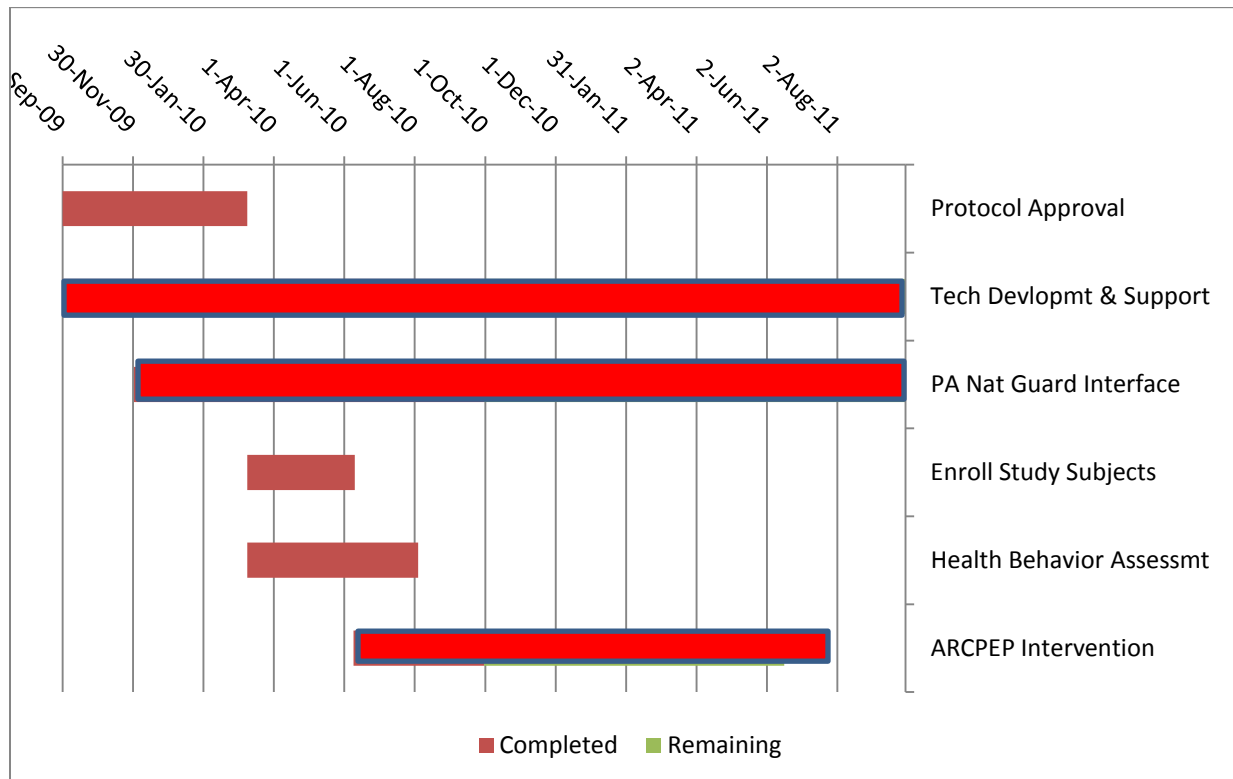
The web-based platform was very successful in the assessment of dental and health behaviors that augment cardiovascular risk. The coaches were able to provide information and resource contacts and to gain the cooperation of the soldiers to appropriately assist them and target their needs. The coach platform was successful for emailing, documentation, auto-populating demographics, sending recommendations, deployment of e-education, survey scoring and storage, and interfacing with e-Immune. The ARCPEP technology provided resource links with education support. Furthermore the tool effectively provided a health snapshot, linking survey responses to the soldier's personal ARCPEP page and delivered personalized health messages via the automated personal guidance system (APGS). A major success of the health coach platform was the identification of depressed and stressed soldiers and the provision of accessible outreach resources to these vulnerable soldiers.

The importance of a non-threatening assessment mechanism cannot be overstated. Soldiers can be evaluated for important dental and medical issues in a non-stigmatizing atmosphere that encourage honest responses. This is particularly so when the program is supported by the Command structure as it was in this project. Soldiers with depression and high stress levels were identified and could thereby be contacted via secure e-messaging or telephonically to provide support.



More sophisticated modes of communication to expand on the health coaching successes will be the focus of the ARCPEP continuation project. Plans for the ARCPEP continuation project will include development of an ARCPEP application into cell phone and/or tablet technology that will meet DOD standards for inclusion in other DOD applications such as the mCare warehouse. The application will continue to focus on oral and overall preventive health with special emphasis on modifying lifestyle behaviors to reduce cardiovascular disease and diabetes.

## GANTT CHART



## REFERENCES

1. Pederson CA, Gumpfer KF. ASHP national survey on informatics: assessment of the adoption and use of pharmacy informatics in U.S. hospitals—2007. *Am J Health Syst Pharm* 2008; 65:2244-64
2. Hardiker NR, Grant MJ. Barriers and facilitators that affect public engagement with eHealth services. *Stud Health Technol Inform* 2010; 160:13-7

## DATA SUMMARY

**DEMOGRAPHICAL INFORMATION****Age**

35 ± 9.1, range 20-59 years

**Gender**

Male 236 (90%)

**Race**

White 245 (93%)

Black 7 (3%)

Latino 5 (2%)

Asian 2 (1%)

Not Specified 4 (2%)

**Rank**

O5 1 E9 3

O4 4 E8 10

O3 8 E7 6

O2 6 E6 53

W4 4 E5 78

W3 1 E4 77

W2 1 E3 0

E2 1

Sum 25 228

**Education**

No High School 2 (&lt;1%)

High School 163 (62%)

Associate of Arts 50 (5%)

Bachelors 33 (13%)

Post Graduate 14 (5%)

NS 3 (1%)

**Marital Status**

78 Unmarried (30%)

152 Married (58%)

5 Separated (2%)

26 Divorced (10%)

2 NS (1%)

## **SERVICE INFORMATION**

### **Deployment Location 2008-09**

|     |            |
|-----|------------|
| 248 | Iraq (94%) |
| 10  | NS (4%)    |
| 1   | FIG        |
| 1   | Ft Dix     |
| 1   | Kos        |
| 1   | Kuw        |
| 1   | PA         |

### **Number of Tours**

|        |           |
|--------|-----------|
| 1 Tour | 132 (50%) |
| 2      | 90 (34%)  |
| 3      | 26 (10%)  |
| 4      | 4 (2%)    |
| NS     | 11 (4%)   |

## **DENTAL/ORAL HEALTH INFORMATION**

### **Brush Teeth (Times per day)**

|         |           |
|---------|-----------|
| 0 times | 3 (1%)    |
| 1       | 94 (36%)  |
| 2       | 146 (56%) |
| 3       | 20 (8%)   |

### **Floss Teeth (Times per day)**

|         |       |
|---------|-------|
| 0 times | (45%) |
| 1       | (50%) |
| 2       | (0%)  |
| 3       | (5%)  |

### **Use Mouthwash (Times per day)**

|         |       |
|---------|-------|
| 0 times | (40%) |
| 1       | (55%) |
| 2       | (5%)  |

### **Chew Xylitol Gum**

|     |       |
|-----|-------|
| Yes | (5%)  |
| No  | (95%) |

### **Teeth Cleaning in Last 12 Months**

|     |       |
|-----|-------|
| Yes | (65%) |
| No  | (34%) |

## **MEDICAL INFORMATION**

### **History of High Blood Pressure**

Yes 30 (11%)  
No 229 (87%)  
NA 4 (2%)

### **History of High Cholesterol**

Yes 41 (16%)  
No 210 (80%)  
NA 4 (2%)

### **History of Diabetes**

Yes 2 (1%)  
No 261 (99%)

### **Body Mass Index (kg/m<sup>2</sup>)**

Mean 28.4 + 4.3, range 19 to 48  
Normal (< 25) 46 (17%)  
Overweight (25 to 29) 126 (48%)  
Obese (30 to 34) 70 (27%)  
Very Obese (35 to 39) 15 (6%)  
Very Severely Obese ( $\geq 40$ ) 5 (2%)

## **HEALTH SURVEY INFORMATION**

### **Standardized Depression Question**

Depressed Yes 53 (20%)  
Depressed No 210 (80%)

### **Times per Week with Early Awakenings**

0 47 (18%)  
1 61 (23%)  
2 72 (27%)  
3 74 (28%)  
NA 8 (3%)

### **Perceived Stress Scale (0 to 56)**

Mean 22.2 + 8.1, range 0 to 48  
Less than average (0 to 22) 131 (50%)  
Mild increase (23 to 30) 89 (34%)  
Mod increase (31 to 40) 34 (13%)  
Severe increase (41 to 48) 5 (2%)  
NA 4 (2%)

**Effectively Dealing with Stress**

|        |   |          |
|--------|---|----------|
| Often  | 5 | 73 (28%) |
|        | 4 | 46 (17%) |
|        | 3 | 74 (28%) |
|        | 2 | 37 (14%) |
| Rarely | 1 | 32 (12%) |

**Berlin Questionnaire for Sleep Apnea**

|                          |           |
|--------------------------|-----------|
| Positive for Sleep Apnea | 106 (40%) |
| Negative for Sleep Apnea | 152 (58%) |
| NA                       | 5 (2%)    |

**Pittsburgh Sleep Quality Index (0 to 21)**

Mean  $7.3 \pm 4.0$ , range 0 to 21

|                                  |           |
|----------------------------------|-----------|
| Normal score (< than 5)          | 73 (28%)  |
| Mild abnormality (5 to 9)        | 110 (42%) |
| Mod abnormality (10 to 14)       | 59 (22%)  |
| Severe abnormality ( $\geq 15$ ) | 13 (5%)   |
| NA                               | 8 (3%)    |

**Sleep Quality by Self Report (Past Month)**

|             |           |
|-------------|-----------|
| Very Good   | 44 (16%)  |
| Fairly Good | 129 (49%) |
| Fairly Bad  | 66 (25%)  |
| NA          | 8 (3%)    |

**Epworth Sleepiness Scale (0 to 24)**

Mean  $8.2 \pm 4.8$ , range 0 to 24

|                            |           |
|----------------------------|-----------|
| Not sleepy (< 10)          | 174 (66%) |
| Mildly sleepy (11 to 14)   | 55 (21%)  |
| Mod sleepy (15 to 19)      | 19 (7%)   |
| Severely sleepy (20 to 24) | 8 (3%)    |
| NA                         | 7 (3%)    |

**Fatigue Scale (0 to 10)**

Mean  $4.2 \pm 2.2$ , range 0 to 10

|                          |          |
|--------------------------|----------|
| Not fatigued (< 4)       | 99 (38%) |
| Mild fatigue (5 to 6)    | 97 (37%) |
| Mod fatigue (7 to 8)     | 46 (17%) |
| Severe fatigue (9 to 10) | 5 (2%)   |
| NA                       | 6 (2%)   |

## **HEALTH BEHAVIORS**

### **Blood Pressure Check in Last Year**

Yes 235 (89%)  
No 26 (10%)  
NA 2 (1%)

### **Cholesterol Check in Last Year**

Yes 167 (63%)  
No 95 (36%)  
NA 1 (<1%)

### **Glucose Check in Last Year**

Yes 91 (35%)  
No 169 (64%)  
NA 3 (1%)

### **Smoke Cigarettes**

107 (41%) smoke  
156 (59%) do not smoke

### **Servings of Fruits/Vegetables (per day)**

1 88 (30%)  
2 85 (32%)  
3 53 (20%)  
4 26 (10%)  
5 11 (42%)  
6 1 (<1%)  
7 2 (1%)

### **Servings of Meat (per week)**

1 166 (63%)  
2 75 (29%)  
3 22 (8%)

### **Mediterranean Diet Score (X/14)**

Mean  $4.6 \pm 2.2$ , range 0 to 14  
Lowest Third (0 to 4) 129 (49%)  
Middle Third (5 to 10) 122 (46%)  
Highest Third (11 to 14) 6 (2%)  
NA 6 (2%)

### **Times per Week at least 7 hrs sleep**

0 times per wk 89 (34%)  
<3 104 (40%)  
3 to 5 67 (25%)  
> 5 2 (1%)

**Hrs of Sleep per Night by Self Report**

Mean 6.2 + 1.3 hrs, range 2 to 9.5 hrs

< minimum recommended 7 hrs/night = 160 (61%)

**Sleep Efficiency (Time Asleep / Time in Bed; normal  $\geq 70\%$ )**

Mean 84.2 + 14.4%, range 30 to 100%

Abnormal 99 (38%)

NA 9 (3%)

**Sleep Latency (Time to Fall Asleep; normal  $\leq 25$  min)**

Mean 26.4 + 27.3 min, range 1 to 210 min

Abnormal 95 (38%)

NA 9 (3%)

**Times per Week > 30 min to sleep**

0 88 (33%)

1 61 (23%)

2 52 (20%)

3 51 (19%)

NA 10 (4%)

**Times per Week Awakened by Bad Dreams**

None 146 (55%)

< 1 57 (22%)

1 or 2 38 (14%)

$\geq 3$  18 (7%)

NA 9 (3%)

**Times per Month Used Sleep Aids**

Not in past month 194 (73%)

Less than once/wk 21 (18%)

Once or Twice/wk 12 (5%)

Three or More/wk 28 (11%)

NS 8 (3%)

## **HEALTH KNOWLEDGE**

### **Know BP Reading?**

Yes 95 (36%)  
No 168 (64%)

### **Know Total Cholesterol Number?**

Yes 23 (9%)  
No 240 (91%)

### **Know Glucose Number?**

Yes 12 (5%)  
No 251 (95%)

### **Score on Health Knowledge Test (18 points = 100%)**

Mean  $12.1 \pm 2.0$ , range 6-18

Scored less than 12 points (< mean or 66%) = 91 (35%)

### **Score on Dental Knowledge Test (6 points = 100%)**

|                              | 2010       | 2011       | p value |
|------------------------------|------------|------------|---------|
| Intervention Cohort (n = 45) | 4.23 (70%) | 4.61 (77%) | 0.06    |
| Control Cohort (n = 49)      | 4.24 (71%) | 4.51 (75%) | 0.23    |

### **Familiar with Vaccine Health Network?**

Yes 57 (22%)  
No 202 (77%)  
NA 4 (2%)

### **Repeat Vaccinations?**

No 101 (38%)  
Yes 131 (50%)  
Don't Know 27 (10%)  
NA 4 (2%)

## **HEALTH RESOURCES**

### **Do You Have a Primary Care Provider?**

No PCP 1 (<1%)  
PCP from VA 15 (6%)  
PCP from Tricare 2 (1%)  
PCP from FIG, DOD, PANG 7 (3%)  
PCP private 4 (2%)  
Na 4 (2%)



**Do You Have Insurance?**

|                |         |
|----------------|---------|
| No Insurance   | 0 (0%)  |
| VA             | 16 (6%) |
| Tricare        | 2 (1%)  |
| FIG, DOD, PANG | 7 (3%)  |
| Private        | 4 (2%)  |
| NA             | 4 (2%)  |

**Do You Have a Dentist?**

|                |         |
|----------------|---------|
| No Dentist     | 0 (0%)  |
| VA             | 16 (6%) |
| Tricare        | 2 (1%)  |
| FIG, DOD, PANG | 7 (7%)  |
| Private        | 4 (2%)  |
| NA             | 4 (2%)  |

**DEPRESSION STATISTICS as of 9/29/10**

- 53     Answered “yes” on Depression Screening Question of Health Survey
- 37     Received Certified Letter after being called three times and three emails
- 7     Already in counseling when we spoke to them
- 2     Initiated counseling after talking with ARCPEP Health Coach
- 1     Initiated counseling after receiving Certified Letter
- 7     Did not feel they required counseling assistance at this time
- 1     Did not want to be contacted by phone or email or USPS mail

## **DATA ANALYSIS**

### **Comparison by Depression**

53 soldiers screening positive for depression were compared with 210 screening negative for depression.

The depressed group had fewer deployments on average (1.4 vs 1.7,  $p = 0.02$ ).

Regarding Health Knowledge, the depressed group scored lower on the dental knowledge test, specifically below the mean, compared to the non-depressed group who scored slightly above the mean,  $p = 0.03$ .

Other differences appeared on Health Survey questions. The depressed group experienced much higher stress on the Perceived Stress Scale (PSS 29.6 vs 20.3,  $p < 0.001$ ); and reported more frequent difficulty finding enthusiasm (1 or 2 times per week vs less than once per week,  $p < 0.001$ ). Sleep quality was worse in the depressed group with self-reported sleep quality 1.7 vs 1.1,  $p < 0.001$  and Pittsburgh Sleep Quality Index (PSQI) 10.6 (moderately disturbed) vs 6.5 (mildly disturbed),  $p < 0.001$ . The depressed group had more daytime sleepiness (Epworth Sleepiness Score 10.2 vs a normal score of 6.5,  $p < 0.001$ ); and more fatigue 5.5 (moderate fatigue) vs 3.8 (no fatigue)  $p < 0.001$ . The depressed group reported less total sleep time (5.7 vs 6.3 hrs,  $p = 0.001$ ); longer sleep latency (42.8 vs 22.2 min,  $p < 0.001$ ); poorer sleep efficiency (75.3 vs 86.3%,  $p < 0.001$ ); more early awakenings (2.2 vs 1.5,  $p < 0.001$ ); greater use of sleep aids,  $p < 0.001$ ; and more frequent bad dreams (1.3 vs 0.5,  $p < 0.001$ ).

### **Comparison by Rank**

25 officers were compared with 228 non-commissioned officers (NCOs) and enlisted soldiers. Officer ranks ranged from W2 to O5. NCO and enlisted ranged from E2 to E9.

Officers were older (40.5 vs 34.4 yrs,  $p = 0.001$ ); better educated (Bachelors degree or more vs high school or Associates degree,  $p < 0.001$ ); and had more deployments on average (2.0 vs 1.6,  $p = 0.02$ ).

Health Behaviors were better in the officer group. Officers slept somewhat more (1.3 vs 0.9 nights per week with at least 7 hours sleep,  $p = 0.05$ ); less frequently smoked (12 vs 44%,  $p = 0.002$ ); were more likely to get fasting glucose checked (60 vs 47%,  $p = 0.006$ ); and were more likely to follow a Mediterranean Diet (5.8 vs 4.5 points,  $p = 0.005$ ).

Health Surveys revealed that officers experienced less stress (PSS 17.8 vs 22.6,  $p = 0.004$ ); had better sleep quality (PSQI 5.56 vs 7.49,  $p = 0.02$ ); got more sleep on average (6.7 vs 6.1 hrs,  $p = 0.03$ ); and felt less fatigued (3.2 vs 4.3,  $p = 0.02$ ). Officers did however awaken to urinate more frequently (1.8 vs 1.1 times per night,  $p = 0.001$ ).

### **Comparison by Number of Deployments**

120 soldiers who had more than one deployment (range 2 to 4) were compared with 132 soldiers who had experienced only one deployment.

Soldiers with multiple deployments were somewhat older (37.3 vs 33.1 yrs,  $p < 0.001$ ); and were less likely to be depressed (13 vs 27,  $p = 0.006$ ).

Health Surveys revealed that soldiers with multiple deployments experienced less stress (PSS 20.6 vs 23.6,  $p = 0.003$ ); had better sleep quality (PSQI 6.7 vs 7.9,  $p = 0.02$ ); shorter sleep latency (22.1 vs 30.0 min,  $p = 0.03$ ); and had fewer nights with bad dreams (0.54 vs 0.79,  $p = 0.04$ ).

### **Comparison by Health Survey Results for Sleep Apnea (Berlin Questionnaire)**

105 soldiers scored highly likely to have sleep apnea. These soldiers were compared with 153 soldiers who screened negative for sleep apnea.

Solders with sleep apnea were slightly older (36.9 vs 33.8 years,  $p = 0.008$ ), and had higher body mass index (BMI 30.1 vs 27.3,  $p < 0.001$ ).

Solders with sleep apnea were more likely to have hypertension (24 vs 4%,  $p < 0.001$ ); and more likely to have high cholesterol (25 vs 11%,  $p = 0.006$ ).

Health Behaviors were worse in soldiers with sleep apnea. These soldiers brushed their teeth less often on average (1.5 vs 1.8 times per day,  $p < 0.001$ ); exercised less (2.3 vs 2.9 times per week,  $p = 0.01$ ); slept at least 7 hrs less often (0.8 vs 1.0 times per week,  $p = 0.04$ ); and were more likely to smoke (48 vs 35%,  $p = 0.04$ ).

Health Surveys revealed numerous problems in soldiers with sleep apnea. These soldiers experienced greater stress levels (PSS 23.3 vs 21.3  $p = 0.05$ ); poorer self-reported sleep quality (1.46 vs 1.04,  $p < 0.001$ ); poorer PSQI (8.6 vs 6.4,  $p < 0.001$ ); greater daytime sleepiness (ESS 9.8 vs 7.1,  $p < 0.001$ ); greater fatigue (4.9 vs 3.7,  $p < 0.001$ ); less total sleep time (5.8 vs 6.5 hrs per night,  $p < 0.001$ ); poorer sleep efficiency (81 vs 87%,  $p = 0.001$ ); more early awakenings (1.9 vs 1.6 per night,  $p = 0.05$ ); and more difficulty finding enthusiasm (1.1 vs 0.79,  $p = 0.003$ ).

### **Comparison by Body Mass Index (BMI)**

46 soldiers of normal BMI were compared with 216 soldiers who were overweight or obese by BMI criteria. The main differences between these groups were that the soldiers with high BMI more frequently had high cholesterol (19% vs 4%,  $p = 0.01$ ) and sleep apnea (44% vs 27 %,  $p = 0.04$ ).

**Adverse Events to date:** None

## PITTSBURGH SLEEP QUALITY INDEX (PSQI)

*The following questions relate to your usual sleep habits during the past month ONLY. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. Please answer all questions.*

**1. During the past month, when have you usually gone to bed at night?**

USUAL BED TIME \_\_\_\_\_

**2. During the past month, how long (in minutes) has it usually taken you to fall asleep each night?**

NUMBER OF MINUTES \_\_\_\_\_

**3. During the past month, when have you usually gotten up in the morning?**

USUAL GETTING UP TIME \_\_\_\_\_

**4. During the past month, how many hours of *actual sleep* did you get at night? (This may be different than the number of hours you spend in bed.)**

HOURS OF SLEEP PER NIGHT \_\_\_\_\_

For each of the remaining questions, check the one best response. Please answer *all* questions.

**5. During the past month, how often have you had trouble sleeping because you.....**

**(a) cannot get to sleep within 30 minutes**

|                                    |                                |                               |                                     |
|------------------------------------|--------------------------------|-------------------------------|-------------------------------------|
| Not during the<br>past month _____ | Less than<br>once a week _____ | Once or<br>twice a week _____ | Three or more<br>times a week _____ |
|------------------------------------|--------------------------------|-------------------------------|-------------------------------------|

**(b) Wake up in the middle of the night or early morning**

|                                    |                                |                               |                                     |
|------------------------------------|--------------------------------|-------------------------------|-------------------------------------|
| Not during the<br>past month _____ | Less than<br>once a week _____ | Once or<br>twice a week _____ | Three or more<br>times a week _____ |
|------------------------------------|--------------------------------|-------------------------------|-------------------------------------|

**(c) Have to get up to use the bathroom.**

|                                    |                                |                               |                                     |
|------------------------------------|--------------------------------|-------------------------------|-------------------------------------|
| Not during the<br>past month _____ | Less than<br>once a week _____ | Once or<br>twice a week _____ | Three or more<br>times a week _____ |
|------------------------------------|--------------------------------|-------------------------------|-------------------------------------|

**(d) Cannot breathe comfortably.**

|                                    |                                |                               |                                     |
|------------------------------------|--------------------------------|-------------------------------|-------------------------------------|
| Not during the<br>past month _____ | Less than<br>once a week _____ | Once or<br>twice a week _____ | Three or more<br>times a week _____ |
|------------------------------------|--------------------------------|-------------------------------|-------------------------------------|

**(e) Cough or snore loudly.**

|                                    |                                |                               |                                     |
|------------------------------------|--------------------------------|-------------------------------|-------------------------------------|
| Not during the<br>past month _____ | Less than<br>once a week _____ | Once or<br>twice a week _____ | Three or more<br>times a week _____ |
|------------------------------------|--------------------------------|-------------------------------|-------------------------------------|

**(f) Feel too cold.**

|                                    |                                |                               |                                     |
|------------------------------------|--------------------------------|-------------------------------|-------------------------------------|
| Not during the<br>past month _____ | Less than<br>once a week _____ | Once or<br>twice a week _____ | Three or more<br>times a week _____ |
|------------------------------------|--------------------------------|-------------------------------|-------------------------------------|

**(g) Feel too hot.**

|                                    |                                |                               |                                     |
|------------------------------------|--------------------------------|-------------------------------|-------------------------------------|
| Not during the<br>Past month _____ | Less than<br>once a week _____ | Once or<br>twice a week _____ | Three or more<br>times a week _____ |
|------------------------------------|--------------------------------|-------------------------------|-------------------------------------|

**(h) Had bad dreams.**

|                                    |                                |                               |                                     |
|------------------------------------|--------------------------------|-------------------------------|-------------------------------------|
| Not during the<br>Past month _____ | Less than<br>once a week _____ | Once or<br>twice a week _____ | Three or more<br>times a week _____ |
|------------------------------------|--------------------------------|-------------------------------|-------------------------------------|

**(i) Have pain.**

|                                    |                                |                               |                                     |
|------------------------------------|--------------------------------|-------------------------------|-------------------------------------|
| Not during the<br>Past month _____ | Less than<br>once a week _____ | Once or<br>twice a week _____ | Three or more<br>times a week _____ |
|------------------------------------|--------------------------------|-------------------------------|-------------------------------------|

**(j) Other reason(s), please describe \_\_\_\_\_**

**How often during the past month have you had trouble sleeping because of this?**

|                 |                  |                   |                   |
|-----------------|------------------|-------------------|-------------------|
| Not during the  | Less than        | Once or           | Three or more     |
| Past month_____ | once a week_____ | twice a week_____ | times a week_____ |

**6. During the past month, how would you rate your sleep quality overall?**

Very good \_\_\_\_\_

Fairly good \_\_\_\_\_

Fairly bad \_\_\_\_\_

Very bad \_\_\_\_\_

**7. During the past month, how often have you taken medicine (prescribed or "over the counter") to help you sleep?**

|                 |                  |                   |                   |
|-----------------|------------------|-------------------|-------------------|
| Not during the  | Less than        | Once or           | Three or more     |
| Past month_____ | once a week_____ | twice a week_____ | times a week_____ |

**8. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?**

|                 |                  |                   |                   |
|-----------------|------------------|-------------------|-------------------|
| Not during the  | Less than        | Once or           | Three or more     |
| Past month_____ | once a week_____ | twice a week_____ | times a week_____ |

**9. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?**

No problem at all \_\_\_\_\_

Only a very slight problem \_\_\_\_\_

Somewhat of a problem \_\_\_\_\_

A very big problem \_\_\_\_\_

**10. Do you have a bed partner or share a room?**

No bed partner or do not share a room \_\_\_\_\_

Partner/ flatmate in other room \_\_\_\_\_

Partner in same room, but not same bed \_\_\_\_\_

Partner in same bed \_\_\_\_\_

**11. If you have a bed partner or share a room, ask him/her how often in the past month you have had.....**

**(a) Loud snoring.**

|                 |                  |                   |                   |
|-----------------|------------------|-------------------|-------------------|
| Not during the  | Less than        | Once or           | Three or more     |
| Past month_____ | once a week_____ | twice a week_____ | times a week_____ |

**(b) Long pauses between breaths while asleep.**

|                 |                  |                   |                   |
|-----------------|------------------|-------------------|-------------------|
| Not during the  | Less than        | Once or           | Three or more     |
| Past month_____ | once a week_____ | twice a week_____ | times a week_____ |

**(c) Legs twitching or jerking while you sleep.**

|                 |                  |                   |                   |
|-----------------|------------------|-------------------|-------------------|
| Not during the  | Less than        | Once or           | Three or more     |
| Past month_____ | once a week_____ | twice a week_____ | times a week_____ |

**(d) Episodes of disorientation or confusion during sleep.**

|                 |                  |                   |                   |
|-----------------|------------------|-------------------|-------------------|
| Not during the  | Less than        | Once or           | Three or more     |
| Past month_____ | once a week_____ | twice a week_____ | times a week_____ |

**(e) Other restlessness while you sleep: please describe \_\_\_\_\_**

|                 |                  |                  |                   |
|-----------------|------------------|------------------|-------------------|
| Not during the  | Less than        | Once or          | Three or more     |
| Past month_____ | once a week_____ | wice a week_____ | times a week_____ |

## Appendix 3

# EPWORTH SLEEPINESS SCALE

Name \_\_\_\_\_

Today's Date \_\_\_\_/\_\_\_\_/\_\_\_\_ Your age (years) \_\_\_\_ Your sex (male, female)

How likely are you to doze off or fall asleep in the following situations, in contrast to feeling just tired? This refers to your usual way of life in recent times. Even if you have not done some of these things recently, try to work out how they would have affected you. Use the following scale to choose the most appropriate number for each situation:

0 = would *never* doze

1 = *slight* chance of dozing

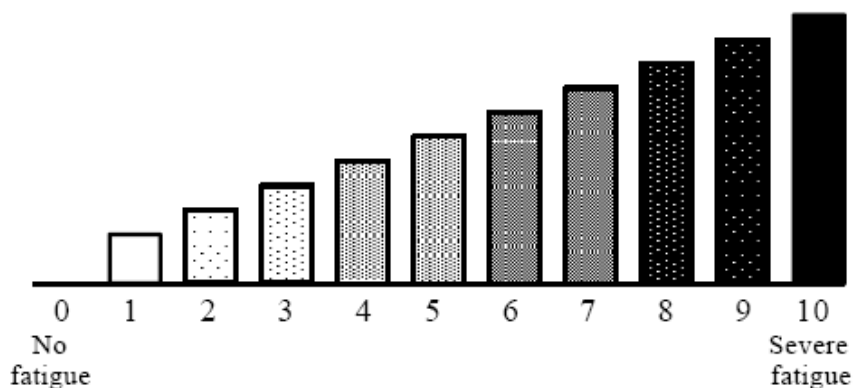
2 = *moderate* chance of dozing

3 = *high* chance of dozing

| Situation                                                       | Chance of Dozing |
|-----------------------------------------------------------------|------------------|
| Sitting and reading                                             | _____            |
| Watching TV                                                     | _____            |
| Sitting, inactive in a public place (e.g. theater or a meeting) | _____            |
| As a passenger in a car for an hour without a break             | _____            |
| Lying down to rest in the afternoon when circumstances permit   | _____            |
| Sitting and talking to someone                                  | _____            |
| Sitting quietly after a lunch without alcohol                   | _____            |
| In a car, while stopped for a few minutes in the traffic        | _____            |

# FATIGUE SCALE

Please circle the number below that describes your fatigue over the past 2 weeks.



## Appendix 4

### Berlin Questionnaire

1. Do you snore?    ☐ Yes    ☐ No    ☐ Don't know
2. Your snoring is
  - ☐ slightly louder than breathing
  - ☐ as loud as talking
  - ☐ louder than talking
  - ☐ very loud. Can be heard in adjacent rooms.
3. How often do you snore?
  - ☐ nearly every day
  - ☐ 3-4 times a week
  - ☐ 1-2 times a week
  - ☐ 1-2 times a month
  - ☐ never or nearly never
4. Has your snoring ever bothered other people?    ☐ Yes    ☐ No
5. Has anyone noticed that you quit breathing during your sleep?
  - ☐ nearly every day
  - ☐ 3-4 times a week
  - ☐ 1-2 times a week
  - ☐ 1-2 times a month
  - ☐ never or nearly never
6. How often do you feel tired or fatigued after your sleep?
  - ☐ nearly every day
  - ☐ 3-4 times a week
  - ☐ 1-2 times a week
  - ☐ 1-2 times a month
  - ☐ never or nearly never
7. During your waketime, do feel tired, fatigued or not up to par?
  - ☐ nearly every day
  - ☐ 3-4 times a week
  - ☐ 1-2 times a week
  - ☐ 1-2 times a month
  - ☐ never or nearly never
8. Have you ever nodded off or fallen asleep while driving a vehicle?    ☐ Yes    ☐ No
9. If yes, now often does it occur?
  - ☐ nearly every day
  - ☐ 3-4 times a week
  - ☐ 1-2 times a week
  - ☐ 1-2 times a month
  - ☐ never or nearly never

10. Do you have high blood pressure? ☐ Yes ☐ No ☐ Don't know

11. BMI  $\geq$  30? ☐ Yes ☐ No

## Appendix 5

### **Perceived Stress Scale**

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate how often you felt or thought a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate question. The best approach is to answer each question fairly quickly. That is, don't try to count up the number of times you felt a particular way, but rather indicate the alternative that seems like a reasonable estimate.

|                                                                                                                                         | never                 | almost<br>never       | some-<br>times        | fairly<br>often       | very<br>often         |
|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 1. In the last month, how often have you been upset because of something that happened unexpectedly?                                    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 2. In the last month, how often have you felt that you were unable to control the important things in your life?                        | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 3. In the last month, how often have you felt nervous and "stressed"?                                                                   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 4. In the last month, how often have you dealt successfully with irritating life hassles?                                               | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 5. In the last month, how often have you felt that you were effectively coping with important changes that were occurring in your life? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 6. In the last month, how often have you felt confident about your ability to handle your personal problems?                            | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 7. In the last month, how often have you felt that things were going your way?                                                          | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 8. In the last month, how often have you found that you could not cope with all the things you had to do?                               | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 9. In the last month, how often have you been able to control irritations in your life?                                                 | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 10. In the last month, how often have you felt that you were on top of things?                                                          | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 11. In the last month, how often have you been angered because of things that happened that were outside of your control?               | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 12. In the last month, how often have you found yourself thinking about things that you have to accomplish?                             | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 13. In the last month, how often have you been able to control the way you spend your time?                                             | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 14. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?                    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |



## Appendix 6

### 14 Point Mediterranean Diet Questionnaire

| Foods and Frequency of Consumption                                                                                                            | Criteria for 1 Point* |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| 1. Do you use olive oil as your main dietary fat?                                                                                             | Yes                   |
| 2. How much olive oil do you consume in a given day (including oil used for frying, salads, out of house meals, etc.)?                        | ≥ 4 tbsp              |
| 3. How many vegetable servings do you consume per day? (1 serving = ½ cup cooked or 1 cup raw)                                                | ≥ 2                   |
| 4. How many fruit units do you consume per day? (1 serving = one 2" apple or ½ cup canned fruit or 4 ounces fruit juice or ¼ cup dried fruit) | ≥ 3                   |
| 5. How many servings of red meat, hamburger or meat products (ham, sausage, etc.) do you consume per day? (1 serving = 3.5-5 ounces)          | < 1                   |
| 6. How many servings of butter, margarine, or cream do you consume per day? (1 serving = ½ ounce = 1 tsp)                                     | < 1                   |
| 7. How many sweet or carbonated beverages do you drink per day?                                                                               | < 1                   |
| 8. How much wine do you drink per week? (1 serving = 5 ounces)                                                                                | ≥ 3 glasses           |
| 9. How many servings of legumes do you consume per week? (1 serving = 1/2 cup)                                                                | ≥ 3                   |
| 10. How many servings of fish or shellfish do you consume per week? (1 serving = 3.5 – 5 ounces of fish or 7 ounces of shellfish)             | ≥ 3                   |
| 11. How many times per week do you consume commercial sweets or pastries (not homemade) such as cakes, cookies, biscuits or custard?          | < 3                   |
| 12. How many servings of nuts (including peanuts) do you consume per week? (1 serving = 1 ounce)                                              | ≥ 1                   |
| 13. Do you preferentially consume chicken, turkey instead of veal, pork, hamburger or sausage?                                                | Yes                   |
| 14. How many times per week do you consume vegetables, pasta, rice or other dishes seasoned with garlic, onion and olive oil?                 | ≥ 2                   |

\*0 points if these criteria are not met

## Appendix 7

### Behavioral Health Questionnaire

#### Dental

Have you had a dental cleaning in the last 12 months? No Yes  
 How often do you brush your teeth with fluoride toothpaste each day? 0 1 2 3  
 How often do you floss your teeth each day? 0 1 2  
 Do you use mouth wash/rinse? No Yes  
 If yes, you use mouth wash: rarely weekly daily >daily  
 Do you chew xylitol gum? No Yes  
 If yes, you chew xylitol gum: rarely weekly daily >daily

#### Exercise

How many days per week do you exercise for at least 30 min continuously?  
 0 1 2 3 4 5 6 7

#### Nutrition

How many servings of fruits and vegetables (total) do you eat per day?  
 0 1 2 3 4 5 6 7  
 How often do you eat red meat, hamburger or meat products per week (not chicken or fish)?  
 Never 1 to 3 4 to 5 6 to 7  
 How often do you eat whole wheat bread/pasta or brown rice per week?

Never      1 to 3      4 to 5      6 to 7

### Weight

What is your current weight? \_\_\_\_\_ lbs

What is your height? \_\_\_\_\_ in

### Sleep

How many nights per week do you get at least 7 hrs of sleep?

<3      3 to 5      >5      nights/week

### Mood

In the last month, how often have you felt that you **were effectively dealing** with stress that was occurring in your life?

1      2      3      4      5  
Rarely      Often

In the past 6 months, has there ever been a time when you felt depressed, sad, or blue for 2 weeks or more in a row?      No      Yes

### Tobacco Use

Do you smoke cigarettes, cigars, pipes or use snuff, dip or chew?      No      Yes

If yes, \_\_\_\_\_ cigarettes/day, \_\_\_\_\_ cigars/day, \_\_\_\_\_ dips or chews/day

### Health Maintenance

Do you have high blood pressure?      No      Yes

Have you had your blood pressure checked in the last year?      No      Yes

Can you enter the numbers?      No      Yes      If yes, \_\_\_\_\_/\_\_\_\_\_

Do you have high cholesterol?      No      Yes

Have you had your cholesterol checked in the last 2 years?      No      Yes

Can you enter the number?      No      Yes      If yes, \_\_\_\_\_

Do you have Diabetes?      No      Yes

Have you ever had high a blood sugar level?      No      Yes

Have you had a blood sugar test in the past year?      No      Yes

Can you enter the number?      No      Yes      If yes, \_\_\_\_\_

## Appendix 8

### Dental and Health Test

1. If your mouth is in bad shape, you can develop a life-threatening infection during deployment.

True\*

False

2. Most dental emergencies that occur during field exercises or deployment could be prevented if Soldiers make sure they are Dental Class 1 before leaving garrison.

True\*

False

3. Reserve Component Soldiers run into problems when they

Do not brush and floss daily

Eat a poor diet high in refined carbohydrates

Forego a yearly dental cleaning

Ignore their mouth until something hurts

A and C

A, B, and D

All of the above\*

4. It is normal for gums to bleed when brushing your teeth.  
True  
False\*
5. If an infection in your gums is left untreated, it can spread to your throat or to your brain and cause death.  
True\*  
False
6. Which of the following is NOT likely to cause tooth decay when used frequently during the day or between meals?  
Regular soft drinks (soda, pop)  
Sports drinks or energy drinks  
Starchy snacks like cookies or crackers  
Juice (orange, grape, apple, etc)  
Milk\*
7. Which of the following can you do to minimize damage to teeth by drinking sugar-sweetened drinks?  
Always floss immediately after drinking a sugar-sweetened drink.  
Only drink sugar-sweetened beverages between meals.  
Drink sugar-sweetened drinks slowly – sip them rather than gulping them down.  
Combine sugar-sweetened drinks with meals or reduce the number that you drink.\*
8. Which of the following is NOT true about using your toothbrush? (Check all that do NOT apply)  
Tilt the brush so that the bristles are at an angle to your teeth.  
Press firmly when you brush, in order to remove more plaque. \*  
Brush all tooth surfaces with a side-to-side motion. \*  
Use the toothbrush to gently brush your tongue and roof of your mouth.
9. If you don't have a toothbrush or toothpaste,  
Just wait until you have toothpaste to brush.  
Wrap some cloth around your finger and wipe your teeth\*  
Just floss once a day.  
Rinse with mouthwash instead.  
Any of these is OK, it really doesn't matter.
10. How many times in a day should a Soldier brush with fluoride toothpaste to keep his/her teeth and gums healthy?  
3 or more times a day  
2 or 3 times a day\*  
Once a day  
Less than once a week  
As often as necessary to keep the Soldier's mouth from smelling bad
11. How often should a Soldier floss to keep his/her teeth and gums healthy?  
Three times a day  
Twice a day  
Once a day\*  
Every other day  
Once a week
12. Which of the following can increase a person's chances of getting mouth or lip cancer?  
(Check all that apply)  
Poor nutrition (not enough vitamins and minerals)  
Smoking cigarettes\*  
Reduced exposure to sunlight

Smoking cigars, pipe, or water pipe\*  
Eating hot, spicy foods  
Using smokeless tobacco (dip, moist snuff, chew)\*  
Frequently biting the cheek or lip

13. Over 90% of patients with heart disease suffer from moderate to severe gum disease.

True\*  
False

14. Eating starchy foods (crackers, pretzels, bread, etc.) between meals does not cause tooth decay.

True  
False\*

15. What makes for a well balanced diet?

Nutritious foods that have low amounts of sugar  
Eating 5 servings of fruits and vegetables a day  
Drinking skim milk instead of sports drinks after exercise  
Snacking on fruit, nuts, cheese or raw veggies instead of candy  
All of the above\*  
None of the above

16. How often should a Soldier visit the dentist?

Every 3 months  
Every 6 months  
At least once every year for an examination and cleaning or as often as the dentist recommends\*  
Every other year  
Only when the Soldier has a toothache

17. If your gums bleed when you brush or floss your teeth, you should

Stop brushing for a week or so and see if it gets better  
Go see the dentist as soon as possible  
Brush and floss more often, and see if it goes away in a week or so\*  
Stop brushing and rinse your mouth with warm salt water every day for 2 weeks

18. Which of the following statements is true?

The only impact using tobacco has on your mouth is that it makes your teeth yellow  
Tobacco can keep your mouth healthy because nicotine kills germs and bacteria  
Tobacco use increases your risk of tooth decay and gum disease\*  
Tobacco use has no negative consequences for your mouth if you brush regularly  
Smokeless tobacco is not harmful to your mouth and gums.

19. Are you aware of the Military Vaccine Health Network?

Yes  
No  
Not Sure

20. Have you received duplicate or re-immunizations because of lost records?

Yes  
No  
Not Sure

**Demographic Information**

1. Name \_\_\_\_\_ 2. Rank \_\_\_\_\_ 3. Age \_\_\_\_\_
4. Race (circle)      White      Black      Hispanic      Asian      Other
5. MOS \_\_\_\_\_, name of job \_\_\_\_\_
6. Civilian employment? \_\_\_\_\_
7. Home zip code \_\_\_\_\_
8. Annual Income (circle)      0 to 25K      26 to 50K      51 to 100K      >100K
9. Education level (circle)      no high school      high school or GED  
     associate's degree      bachelor's degree      post-graduate degree
10. Do you have access to a fax machine?    No    Yes
11. Do you have access to the internet?    No    Yes
12. How frequently do you get online or check email? (circle)  
     1 to 3 times/day      1 to 3 times/week      1 to 3 times/month
13. What is/are the main reason(s) you get online? (circle any that apply)  
     Email    finances (bills/banking)    shopping    work  
     entertainment    seeking information    other
14. Marital Status:   single      married      separated      divorced
15. Deployment: location \_\_\_\_\_ date: \_\_\_\_\_  
                          location \_\_\_\_\_ date: \_\_\_\_\_  
                          location \_\_\_\_\_ date: \_\_\_\_\_

ATTACHMENT A



**DEPARTMENT OF THE ARMY**  
WALTER REED ARMY MEDICAL CENTER  
WALTER REED HEALTH CARE SYSTEM  
WASHINGTON, DC 20307-5001

REPLY TO  
ATTENTION OF

DATE: August 19, 2010

TO: LTC Georgia Dela Cruz, DC, USA

FROM: MAJ Jessica Zaret, MC, Chief, Research Review Service

SUBJECT: IRBNet ID: [350270-8] and Work Unit # 09-7208 - Continuing Review

COMMITTEE APPROVAL DATE: August 10, 2010

REVIEW TYPE: Full Committee Review

STUDY TITLE: ARCPEP--Army Reserve Component Personal Empowerment Program

Dear Dr. Dela Cruz,

1. The continuing review report for this protocol was reviewed and approved in accordance with Federal Human Subject Protection Requirements for continuation for one year. This study is open for accrual. The updated stamped Informed Consent Form(s) (ICFs) should be used for future enrollment and are available in IRBNet under Reviews.
2. The approval of this continuing review expires on September 8, 2011. You will receive automatic reminder notices when the next continuing review is due.
3. POC for this action is Angela Quispe, Continuing Review, (202) 782-7833.

Chief, Research Review Service  
Department of Clinical Investigation

"Electronic Signature Notice: In accordance with the "Government Paperwork Elimination Act" (GPEA) (Pub.L. 105-277; codified at 44 USC 3504); Federal and DOD applicable instructions, directives and regulations, documents have been electronically signed and authorized by all who have been required to do so. These signatures have the same effect as their paper-based counterparts. Verification is retained within our protected electronic records and audit trails."

- 1 -

Generated on IRBNet

9/2/2010 1:03 PM

**Quispe, Angela C Mrs CIV USA MEDCOM WRAMC**

**From:** Sarathy, Komanduri P Dr CIV USA MEDCOM WRAMC  
**Sent:** Wednesday, September 01, 2010 11:45 AM  
**To:** Quispe, Angela C Mrs CIV USA MEDCOM WRAMC  
**Subject:** FW: A-14975, Continuing Review Acceptance Memorandum (Proposal Log Number 08016001, Award Number W81XWH-08-2-0658) (UNCLASSIFIED)

**Classification:** UNCLASSIFIED  
**Caveats:** NONE

Fyi....thanks

-----Original Message-----

**From:** Odam, Kimberly L Ms CIV USA MEDCOM USAMRMC  
**Sent:** Wednesday, September 01, 2010 11:44 AM  
**To:** Dela Cruz, Georgia G LTC MIL USA MEDCOM OTSG  
**Cc:** USAMRMC CLINICAL INVESTIGATION REGULATORY OFFICE; Duchesneau, Caryn L Ms CIV USA MEDCOM USAMRMC; Brosch, Laura R Dr CIV USA MEDCOM USAMRMC; 'ospnga@hjf.org'; 'ssrinagesh@hjf.org'; 'Marianne Spevak'; 'Stanley, Amber Ms IPA'; Wells, Lisa L Ms CIV USA MEDCOM USAMRAA; Moore, Celine A CTR US USA; Bennett, Jodi H Ms CIV USA MEDCOM USAMRMC; Neath, Denise N Ms CIV USA MEDCOM WRAMC; Green, Marty I Ms CIV USA MEDCOM WRAMC; Beaner, Diane M Ms CTR USA MEDCOM WRAMC; Parchment, Verna A Ms CIV USA MEDCOM WRAMC; Kessler, Deborah D Ms CIV USA MEDCOM WRAMC; Zaret, Jessica H MAJ MIL USA MEDCOM WRAMC; Babcock, Janiine COL MIL USA MEDCOM WRAMC; Sarathy, Komanduri P Dr CIV USA MEDCOM WRAMC; Moore, Celine A CTR US USA; Barretto-Jones, Pamela Ms CTR US USA MEDCOM USAMRMC; 'Stephenson, Jeffrey Dr IBA'; Katopol, Kristen R Ms CTR US USA MEDCOM USAMRMC; Odam, Kimberly L Ms CIV USA MEDCOM USAMRMC  
**Subject:** A-14975, Continuing Review Acceptance Memorandum (Proposal Log Number 08016001, Award Number W81XWH-08-2-0658) (UNCLASSIFIED)

**Classification:** UNCLASSIFIED  
**Caveats:** NONE

**SUBJECT:** Continuing Review Acceptance for the Protocol, "ARCPEP Project - Army Reserve Component Personal Empowerment Program," Submitted by LTC Georgia G. Dela Cruz, DC, Office of the Surgeon General (OTSG), Dental Affairs, Leesburg Pike, Virginia, Proposal Log Number 08016001, Award Number W81XWH-08-2-0658, IRBNet 350270, HRPO Log Number A-14975

1. The U.S. Army Medical Research and Materiel Command (USAMRMC), Office of Research Protections (ORP), Human Research Protection Office (HRPO) approved the subject protocol on 9 March 2010.
2. The HRPO received a continuing review report for the subject protocol on 24 August 2010. The Walter Reed Army Medical Center Research Review Service approved continuation of the protocol on 10 August 2010; this approval will expire on 8 September 2011.
3. The submitted continuing review report and supporting documentation have been reviewed by the HRPO and found to be in compliance with Federal, DOD, and U.S. Army human subjects protection requirements. The report and supporting documents are accepted.
4. This study is currently approved for the enrollment of approximately 12 unit Commanders from each unit and up to 600 (300 per unit) Army Reserve/National Guard soldiers subjects. To date, 399 Pennsylvania National Guardsmen have been enrolled in the study - 255 in the intervention arm and 144 in the control arm.

1

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Readiness and Associated Health Behaviors and Symptoms  
in Army National Guard Soldiers

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Key Words: readiness, DENCLASS, health behaviors, prevention, perceived stress, depression, PTSD, smoking

Running Title: Readiness in Army National Guard Soldiers



## ABSTRACT

Readiness is paramount for the reserve forces, especially dental readiness, the leading cause of non-deployable status. The effect of multiple deployments on mental health and its erosion of readiness have also received recent attention. We sought to examine major factors affecting readiness in the Army National Guard (ARNG). From January to June 2010, Pennsylvania ARNG soldiers redeploying from Iraq and Afghanistan were evaluated with validated questionnaires during their first unit formation. Dental classification for each soldier was obtained from the DENCLASS database. The questionnaires assessed dental and health habits, levels of perceived stress, exercise, diet, and sleep habits, and included a screening question for depression. Although results showed 88% dental readiness, a substantial improvement from previously reported readiness conditions (40 to 50%) for the ARNG, our analysis revealed numerous opportunities to improve health behaviors, including dental self-care habits, smoking (41%), diet and sleep habits, as well as management of stress and mood disorders. No negative effects of multiple deployments could be seen in this cohort of ARNG soldiers.

## INTRODUCTION

Military operations in Iraq and Afghanistan have underscored the essential role of the Army Reserve Component (ARC). Without mobilizing US Army Reserve (USAR) soldiers and units from the Army National Guard (ARNG), the missions in Iraq and Afghanistan could not be accomplished. As of February 2009, approximately 691,000 reserve service members had been mobilized in support of operations in Iraq and Afghanistan, with multiple deployments of ARC personnel becoming commonplace.<sup>1</sup>

The impact of multiple deployments to combat theaters has been implicated as a major factor eroding the readiness of war fighters. Operations Iraqi Freedom (OIF) and Enduring Freedom (OEF) have been associated with a high rate of mental health problems, particularly PTSD,<sup>2</sup> and at least seven different studies point to length and frequency of deployment as risks for increased mental health problems.<sup>3</sup>

Other health issues adversely affect operational readiness of the ARC. In 2002, fully 8% of ARC soldiers mobilized were non-deployable for medical reasons.<sup>4</sup> The leading medical reason for non-deployability was dental health (21%). In response to this dental readiness problem, a number of new programs were implemented including new funding programs as well as an initiative in 2006 called the ARNG Decade of Health (DOH).<sup>5</sup> The topic of the first year of the Decade of Health was Oral Health Awareness.

In 2009, the Integrative Cardiac Health Project's at Walter Reed Army Medical Center was commissioned to evaluate issues affecting medical readiness in the ARC. This initiative entitled the Army Reserve Component Personal Empowerment Program, was launched in January 2010 and conducted over the ensuing 6 months. The following report constitutes salient findings of this evaluation of medical readiness issues.

## METHODS

We summarized data from a cross-sectional study of the issues affecting medical readiness of soldiers deployed during OIF and OEF. Pennsylvania ARNG units were studied with the use of validated surveys administered during the first unit drill weekend after re-deployment to the United States upon return from OIF and OEF.

The study group included ARNG soldiers whose responses to the questionnaire survey were obtained in January through June 2010. The questionnaires were administered three to four months after deployment to OIF and OEF. This interval allowed time for soldiers to complete leave, begin reintegration to civilian pursuits, and have an opportunity to seek medical, dental, and mental health treatment if needed.

Unit leaders assembled the soldiers at a variety of National Guard drill centers across Pennsylvania. The study investigators gave a short recruitment briefing and obtained written informed consent on forms that included explanations about the purpose of the investigation, the voluntary nature of participation, and the methods used to protect the private information of the study participants. The study was conducted under a protocol approved by the institutional review board of the Walter Reed Army Medical Center.

The questionnaires gathered information on demographics, current symptoms, past and current medical conditions. Among the questionnaires were validated tools to assess stress levels, sleep behaviors, sleep quality and daytime symptoms from inadequate sleep. The questionnaires included a dental behaviors questionnaire, the Perceived Stress Scale (PSS),<sup>6</sup> Mediterranean Diet Questionnaire, Pittsburgh Sleep Quality Index (PSQI),<sup>7</sup> Epworth Sleepiness Scale (ESS),<sup>8</sup> visual analog Fatigue Scale,<sup>9</sup> Berlin Questionnaire for sleep apnea,<sup>10</sup> and a validated single question to screen for depression. A dental self-care knowledge test was also administered with questions

focusing on common and important activities for maintenance of good oral health. Responses to the questionnaires were entered into an Excel spreadsheet by two trained data management specialists, one to record entries and a second to serve as quality control data checker for all entries. Data sets were scanned for outliers and all such findings were checked against the hard copy of the survey tools. Corrections were implemented as appropriate.

For this study, Dental Class for each soldier was obtained from the Army's computerized DENCLASS database. Functional definitions of dental readiness were aligned with Army Regulations (AR 600-8-101 and AR 40-35). The policy goal aims to have 65% of soldiers in dental class I and 95% in class I or II. Dental readiness (deployability) was defined as Class I or Class II. Dental Class I requires no further treatment. Dental Class II denotes the need for non-urgent routine treatment. Dental Class III identifies urgent conditions that will likely cause a dental emergency within 12 months. Dental Class IV is denoted if there is no examination within the past 12 months or if a panoramic dental x-ray is not on record.

### **Perceived Stress Scale (PSS)**

The PSS is one of the most widely accepted measures of stress.<sup>6</sup> This validated 14-item questionnaire asks the subject how often certain experiences of stress occurred in the last month and is designed to measure the degree to which situations in one's life are appraised as stressful. With item responses from 0 to 4, the range of possible scores is 0 to 56 with higher scores correlating with higher stress. The PSS is designed for use in community samples with at least a junior high school education. The items are easy to understand and the response alternatives are simple to grasp. Moreover, the questions are quite general in nature and hence relatively free of content specific to any subpopulation group. Scores in the low 20's reveal moderate stress levels while scores approaching 30 are substantial and concerning.

## **Pittsburgh Sleep Quality Index (PSQI)**

The PSQI is a self-rated questionnaire which assesses sleep quality and disturbances over a one month time interval.<sup>7</sup> Nineteen individual items generate seven component scores whose sum yields one global score with a range of 0 to 21. The psychometric and clinical properties of the PSQI suggest its utility both in clinical practice and research activities. A global score of greater than 5 indicates a poor sleeper. Sleep perturbations can be categorized by scores: 0 to 5 is a good sleep score; 6 to 10 shows mild sleep difficulty; 11 to 15 moderate sleep difficulty; and 16 to 21 severe sleep difficulty.

## **Epworth Sleepiness Scale (ESS)**

The ESS is the most widely used tool to estimate the subjective symptom of daytime sleepiness.<sup>8</sup> Subjects are asked to use a scale of 0 to 3 to estimate their likelihood of dozing in eight different situations in recent weeks. The individual scores are summed and possible scores range from 0 to 24. Sleepy subjects score 10 or higher and sleepiness can be categorized by scores: 10 to 14 mild sleepiness, 15 to 19 moderate sleepiness, and 20 to 24 severe sleepiness.

## **Fatigue Scale**

The visual numeric Fatigue Scale is borrowed from the Stanford Patient Education Research Center.<sup>9</sup> This fatigue scale asks subjects to express their experience of fatigue from 0 to 10 for the previous 2 week period. Subjects who circle 5 to 6 express mild fatigue, 7 to 8 moderate fatigue, and 9 to 10 severe fatigue.

## **Berlin Questionnaire**

Of questionnaires available to screen subjects for sleep apnea, the Berlin Questionnaire is one of the most commonly used and best validated.<sup>10</sup> As measured by the questionnaire, patients

with persistent and frequent symptoms are considered to be at high risk for sleep apnea.

Questions about symptoms demonstrated internal consistency (Cronbach correlations, 0.86 to 0.92). With a positive Berlin Questionnaire, the sleep apnea was predicted with a sensitivity of 0.86, a specificity of 0.77, a positive predictive value of 0.89, and a likelihood ratio of 3.79.

### **Statistical Analysis**

The study was intended as a hypothesis generating investigation and a formal sample size determination was therefore not performed. Data are presented as mean  $\pm$  standard deviation. Two sample t-tests were used to compare continuous variables between groups and categorical data were compared between groups using the chi square test. Data satisfied assumptions of normality (as tested by the Shapiro-Wilk statistic) and therefore Pearson's product-moment correlation coefficient ( $r_p$ ) was used to examine variable associations. All tests were two-tailed and p values  $< 0.05$  were assumed to represent statistical significance. Data were analyzed using Excel (Microsoft Office 2007).

## RESULTS

Over the six month study enrollment period, 265 Pennsylvania ARNG soldiers consented to participate. Mean age ( $\pm$  SD) was  $35.0 \pm 9.1$  years (range 20 to 59) and 236 (89%) were men. The study population was predominantly white (93%) with 3% black, 2% Latino, 1% Asian, and 2% undeclared. Education reflected current enlistment standards with only 2 soldiers (<1%) not having a high school degree, 163 (62%) with a high school degree, 50 (19%) with an Associates Degree, 33 (12%) with a Bachelors Degree, and 14 (5%) with a Post-Graduate Degree. Three soldiers did not specify their education. Most soldiers were married 152 (57%), while 78 (29%) were single, 5 (2%) separated, 26 (10%) divorced, and 2 not specified.

The computerized DENCLASS database revealed that overall 236 of 265 soldiers (89%) were deployable by dental standards. There were 43 soldiers in Class I (16%), 193 in Class II (73%), 17 in Class III (6%), and 12 in Class IV (5%). There were low but statistically significant correlations with dental classification including age (worse dental classification with older age,  $r_s = 0.112$ ) and various sleep parameters (as dental classification worsened sleep quality improved,  $r_s = -0.112$ , daytime sleepiness improved,  $r_s = -0.123$ , fatigue improved,  $r_s = -0.108$ , and sleep efficiency improved,  $r_s = 0.116$ ). Dental Class did not correlate with dental self-care habits such as frequency of brushing or flossing, use of mouth wash or dental-recommended chewing gum.

Dental self-care habits were not wholly in compliance with recommended frequency. Of 265 soldiers, only 168 (63%) brushed teeth at least twice per day, 94 (35%) brushed once per day, and 3 (1%) did not brush. For flossing, 129 soldiers (49%) did not ever floss, 127 (48%) flossed once per day, and 8 (3%) flossed twice or more per day. Surprisingly, mouthwash was used with greater frequency than other dental self-care with 36 (14%) of soldiers using mouthwash once per day, 114 (43%) twice per day, 27 (10%) three times per day and 88 (33%)

never used mouthwash. Use of xylitol gum was uncommon with 231 (87%) soldiers never chewing xylitol gum, 14 (5%) chewing once per day, 17 (6%) chewing twice per day and 3 (1%) chewing three or more times per day. There were moderately strong correlations between dental self habits, that is, brushers tended to floss ( $r_s = 0.313$ ), and use mouthwash ( $r_s = 0.200$ ). Good dental self-care also correlated mildly with lower BMI ( $r_s = -0.212$ ) and better adherence to a healthy diet (Mediterranean Diet score  $r_s = 0.147$ ; eating fruits and vegetables  $r_s = 0.119$ ). The brief test of dental self-care knowledge showed an average score of 66%.

For deployment data and analysis, please see Table I. Deployments were overwhelmingly to Iraq and Afghanistan, with 10 soldiers not specifying the location, and other single counts reporting deployment locations in Kuwait, Kosovo, Fort Dix, New Jersey and Fort Indiantown Gap, Pennsylvania.

Smoking prevalence in the ARNG was very high (41%) even when compared with recently reported rates for the DoD in general (31% in 2008).<sup>11</sup> Smoking correlated with education level and other health habits such as exercise and diet, see Table II. Smokers had a lower level of education on average ( $r_s = -0.202$ ), exercised less often per week ( $r_s = -0.294$ ), ate less fruits and vegetables per day ( $r_s = -0.191$ ), ate more meat per week ( $r_s = 0.156$ ), and were less likely to eat in accordance with the Mediterranean diet ( $r_s = -0.257$ ). Smoking did not show correlations with dental self-care habits, stress levels, or sleep parameters.

Perceived stress score correlated with lower mood ( $r_s = -0.425$ ), worse sleep quality ( $r_s = 0.520$ ), greater daytime sleepiness ( $r_s = 0.338$ ), greater fatigue ( $r_s = 0.497$ ), and a higher likelihood of having sleep apnea ( $r_s = 0.126$ ).

Answering the screening question for depression with an affirmative response correlated with numerous other factors and symptoms, see Table III. There were numerous anticipated



correlations such as poorer sleep quality, daytime sleepiness, fatigue and enthusiasm, but it was also found that the group screening positive for depression had on average fewer deployments.

Soldiers reported their home addresses with zip codes allowing their distances from metropolitan centers to be calculated. This distance from metropolitan centers did not correlate with any factors collected including number of deployments, age, dental readiness, dental self-care habits, body mass index, dietary habits, exercise habits, mood, depression, or sleep parameters.

## DISCUSSION

A major finding of our investigation was the good state of dental readiness in the Pennsylvania ANG. While our measured dental readiness rate of 88% falls somewhat short of the policy goal of 95%, it is substantially better than the 40 to 50% readiness rates measured in ARC units in 2008.<sup>12</sup> During the House Armed Services Subcommittee Hearings on Dental Readiness in the Reserve Component (dated 23 April 2008) it was outlined that dental readiness of the reserve component is lower than that of the active duty force and that none of the services met the DoD dental readiness standard for Class I or Class II. The Army National Guard was reported to be only 43.2% ready and Army Reserve 50.6% ready. Our current evidence of improved dental readiness strongly supports the effectiveness of new funding programs allowing ARC soldiers to get appropriate dental care paid for by the government.

The dental self-care habits were poor in view of the data revealing that only two thirds of soldiers brushed twice per day, half never flossed, and only one in eight chewed xylitol gum. These statistics indicate a substantial lack of dental health maintenance activities and present an opportunity for improvement in dental prevention. A need for more dental education is borne out by the poor performance on the dental self-care knowledge test.

Our findings regarding the effects of multiple deployments contrast with those of prior publications.<sup>2,3</sup> The Pennsylvania ANG soldiers who had multiple deployments were somewhat older and reported lower perceived stress levels, better overall mood, less likelihood of depression and better sleep quality. In an association study such as this one, it is not possible to attribute causation. However, it is reasonable to speculate that a first deployment serves as a selection process and that soldiers who find a deployment highly stressful or traumatic are not likely to proceed to other deployments. Previous research has shown a greater sensitivity of

women to the effects of multiple deployments/combat exposure and the development of PTSD and depression.<sup>13</sup> Our study population did not allow a statistical comparison between genders because so few women made up our study population.

There are three other issues that are worthy of further attention. These issues are responses to health behavior questions and self-assessment symptoms. If a soldier smokes, expresses a high level of perceived stress, or screens positive for depression, numerous maladaptive behaviors and choices with poor long term consequences are known to be associated and are likely to be present. These soldiers may require a focused effort in education and coaching to adopt more healthful behaviors. Soldiers so identified may benefit from an increased allocation of supportive and preventive resources.

A limitation of our study is the study population which is predominantly male and white. ARNG units from other geographical regions likely reflect different racial demographics and some ARNG units are composed of greater numbers of women. Our study population may therefore limit the ability of generalizing the findings to the ARC population at large.

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**TABLE I. Comparisons between soldiers who deployed once versus those who deployed more than once**

|                                                   | All Soldiers<br>(n=265) | Deployed Once<br>(n=132, 50%) | Deployed > Once<br>(n=120, 45%) | p value |
|---------------------------------------------------|-------------------------|-------------------------------|---------------------------------|---------|
| Age (yrs)                                         | 35±9.1                  | 33.1±9.4                      | 37.3±8.3                        | <0.001  |
| Gender (% men)                                    | 90                      | 86                            | 95                              | 0.03    |
| Mood (out of 5 points)                            | 3.4±1.3                 | 3.2±1.4                       | 3.5±1.2                         | 0.04    |
| Depression (%)                                    | 20                      | 27                            | 13                              | 0.006   |
| Perceived Stress (out of 56 points)               | 22.2±8.0                | 23.6±8.3                      | 20.6±7.6                        | 0.003   |
| Pittsburgh Sleep Quality Index (out of 21 points) | 7.3±4.0                 | 7.9±4.6                       | 6.7±3.1                         | 0.02    |
| Subjective Sleep Quality (out of 5 points)        | 1.2±0.8                 | 1.3±0.8                       | 1.1±0.8                         | 0.02    |
| Sleep Latency (min)                               | 26.3±27.2               | 29.6±32.4                     | 22.1±18.0                       | 0.03    |
| Sleep Efficiency (%)                              | 84.1±14.4               | 82.7±15.1                     | 85.7±13.4                       | 0.10    |

**Table II. Comparisons between non-smokers and smokers**

|                                          | Non-Smokers<br>(n=156, 59%) | Smokers<br>(n=107, 41%) | p value |
|------------------------------------------|-----------------------------|-------------------------|---------|
| Education Level (average)                | Associates Degree           | High School             | 0.001   |
| Exercise Sessions (per week)             | 3.1±1.8                     | 2.0±1.8                 | <0.001  |
| Meat servings (per week)                 | 1.3±0.6                     | 1.6±0.7                 | 0.01    |
| Fruit/Vegetable servings (per day)       | 2.4±1.3                     | 1.9±1.2                 | 0.002   |
| Mediterranean Diet Score (range 0 to 12) | 5.1±2.2                     | 3.9±2.0                 | <0.001  |

**Table III. Comparisons between soldiers who screened positive and negative for depression**

|                                                      | Not Depressed<br>(n=211, 80%) | Depressed<br>(n=53, 20%) | p value |
|------------------------------------------------------|-------------------------------|--------------------------|---------|
| Number of Deployments                                | 1.67                          | 1.38                     | 0.01    |
| Perceived Stress<br>(out of 56 points)               | 20.2                          | 29.8                     | <0.001  |
| Pittsburgh Sleep Quality Index<br>(out of 21 points) | 6.4                           | 10.8                     | <0.001  |
| Total Sleep Time<br>(hours/24 hours)                 | 6.3                           | 5.6                      | <0.001  |
| Epworth Sleepiness Scale<br>(out of 24 points)       | 7.7                           | 10.2                     | <0.001  |
| Fatigue<br>(out of 10 points)                        | 3.8                           | 5.6                      | <0.001  |
| Bad Dreams<br>(out of 4 points)                      | 0.5                           | 1.3                      | <0.001  |
| Early awakenings<br>(out of 4 points)                | 1.5                           | 2.3                      | <0.001  |
| Enthusiasm<br>(out of 4 points)                      | 0.73                          | 1.65                     | <0.001  |

